SECTION 32 90 00
PLANTING

PART 1 - GENERAL

1.1 DESCRIPTION AND REQUIREMENTS

A. This work consists of furnishing and installing all planting materials required for landscaping at all NCA construction projects hereinafter specified in locations as shown. The landscape contractor shall be required to visit the site prior to submitting Bid Proposal to become familiar with all conditions affecting the proposed work. The contractor shall identify and review all underground utility locations prior to commencing work and shall exercise caution when working close to utilities and shall notify the Contracting Officer of apparent conflicts with construction and utilities so that adjustment can be planned prior to installation.

B. Agronomic consultation on the appropriateness of all plant materials proposed for installation during this project must be obtained from the MSN Agronomist and/or NCA Chief Agronomist via coordination through the Contracting Officer prior to project initiation and actual plant installation. In general, all plant material must be regionally adapted to the climate of the site, be of appropriate mature dimensions to fit the planting location and be low maintenance species. This requirement will generally exclude or severely limit the use of rose plants, wild flowers and ground covers.

C. Any exceptions to these species exclusions must be approved by the MSN Agronomist and/or NCA Chief Agronomist via coordination through the Contracting Officer prior to project initiation.

1.2 EQUIPMENT

Maintain all equipment, tools and machinery while on the project in sufficient quantities and capacity for proper execution of the work.

1.3 RELATED WORK

A. Section 31 20 00, EARTH MOVING, Stripping Topsoil and Stock Piling.

B. Section 01 45 29, TESTING LABORATORY SERVICES, Topsoil Testing.

C. Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

1.4 SUBMITTALS

A. Samples: Submit the following samples for approval before work is started:

Inert Mulch	2.3 kg (5 pounds) of each type to be used.
Organic Mulch	2.3 kg (5 pounds) of each type to be used.
All pesticides required such as preemergence or post emergence herbicides, insecticides, or fungicides.	EPA approved labeling and MSDS sheet for each such product selected for use.

B. Certificates of Conformance or Compliance: Before delivery, notarized certificates attesting that the following materials meet the requirements specified shall be submitted to the Contracting Officer for approval:
   1. Plant Materials (Department of Agriculture certification by State Nursery Inspector from the state in which the plant material originates declaring material to be free from insects and disease).
   2. Fertilizers.
   3. Lime
   4. Peat
   5. Seed
   6. Sod
   7. Membranes
   8. Asphalt Adhesive

C. Manufacturer's Literature and Data:
   1. Metal edging
   2. Antidesiccant
   3. Erosion control materials
   4. Hydro mulch
   5. Pre-emergent herbicide

D. Soil laboratory testing results and any soil amendment recommendations from the Contractor. Submit soil test results for each variable soil type and condition that exists on the construction site.
   1. Organic Soil Amendment and Imported Topsoil: The Contractor shall provide a 5 pound representative sample from each proposed source for testing, analysis, and approval. Contractor shall deliver samples to testing laboratories and shall have the testing report sent directly to the Contracting Officer. Testing reports shall include the following tests and recommendations.
      a. Mechanical gradation (sieve analysis) and chemical (pH soluble salts) shall be performed by public extension service agency or a certified private testing laboratory in accordance with the current standards of the Association of Official Agricultural Chemists. A hydrometer shall be used to determine percent of clay and silt.
      b. Percent of organics shall be determined by the loss on ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 110 ºC, plus or minus 5ºC.
      c. Chemical analysis shall be undertaken for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium, Aluminum, Soluble Salts, and acidity (pH).

d. Tests, as specified, for gradation, organics, soil chemistry and pH shall be performed by a testing laboratory retained by the Department of Veterans Affairs as described in Section 01410, TESTING LABORATORY SERVICES.

e. Soil analysis tests shall show recommendations for soil additives to correct soils deficiencies as necessary, and for fertilizing and liming applications to support successful turfgrass growth.

f. All tests shall be performed in accordance with the current standards of the Association of Official Agricultural Chemists.

2. Amended soil (in place): Following the incorporation of amendments and additives, the Contractor shall provide a minimum of six (6)samples per forty thousand (40,0000) square feet, six inch (6”) depth by three inch (3”) diameter core samples of amended soil taken from the site for testing, analysis, and approval. The location of each sample shall be as directed by the Contracting Officer from areas designated to receive turfgrass or be established to turfgrass on the Contract Drawings. No seeding or hydroseeding operations shall occur until acceptance of the amended soil samples has been obtained. Contractor shall deliver samples to testing laboratories and shall have the testing report sent directly to the Contracting Officer. Tests shall be as directed in paragraph 1.4 E.1.d. of this Section.

3. Seed: Submit a manufacturer's Certificate of Compliance to the Specifications with each shipment of each type of seed. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates.

4. Fertilizer: Submit four (4) certificates of analysis for each type of fertilizer.

5. Hydro Mulching: Prior to the start of hydro mulching, submit a certified statement for approval as to the number of pounds of materials to be used per gallon of water.

1.5 DELIVERY AND STORAGE

A. Delivery:

1. Notify the Contracting Officer of the delivery schedule in advance so the plant material may be inspected upon arrival at the job site. Remove unacceptable plant material from the job site immediately.

2. Protect plants during delivery to prevent damage to root balls or desiccation of leaves. Protect trees during transport by tying in the branches and covering all exposed branches.

3. The use of equipment such as "tree spades" is permitted provided the plant balls are sized in accordance with ANSI Z60.1 and tops are protected from damage.
4. Deliver fertilizer and lime to the site in the original, unopened containers bearing the manufacturer's warranted chemical analysis, name, trade name or trademark, and in conformance to state and federal law. In lieu of containers, fertilizer and lime may be furnished in bulk and a certificate indicating the above information shall accompany each delivery.
5. During delivery: Protect sod from drying out and seed from contamination.

B. Storage:
1. Sprinkle sod with water and cover with moist burlap, straw or other approved covering, and protect from exposure to wind and direct sunlight. Covering should permit air circulation to alleviate heat development.
2. Keep seed, lime, and fertilizer in dry storage away from contaminants.
3. Store plants not installed on the day of arrival at the site as follows:
   a. Shade and protect plants from the wind when stored outside.
   b. Heel in bare root plants.
   c. Protect plants stored on the project from drying out at all times by covering the balls or roots with moist sawdust, wood chips, shredded bark, peat moss, or other similar mulching material.
   d. Keep plants, including those in containers, in a moist condition until planted, by watering with fine mist spray.

1.6 PLANTING AND TURFGRASS INSTALLATION SEASONS AND CONDITIONS

A. Perform operations within the following dates: For warm season turfgrass species such as bermudagrass, bahiagrass or St. Augustinegrass, from June 1 through August 1 and for cool season turfgrasses such as Ky. bluegrass, perennial ryegrass, tall fescue and fine fescue from August 15 through September 30. If the construction project necessitates seeding of cool season turfgrass species during the spring, the seeding should occur between May 1 and June 15.

B. No work shall be done when the ground is frozen, snow covered, too wet or in an otherwise unsuitable condition for planting. Special conditions may exist that warrants a variance in the specified planting dates or conditions. Submit a written request to the Contracting Officer stating the special conditions and proposal variance for approval.

1.7 LANDSCAPE PLANT AND TURF ESTABLISHMENT PERIOD

A. The Establishment Period for landscape plants and turfgrass shall begin immediately after installation, with the approval of the CONTRACTING OFFICER and continue for a period of time during the growing season sufficiently long (minimum of 3 months) for the turfgrass and landscape plant materials to

achieve an establishment condition and appearance satisfactory to the MSN Agronomist and NCA. These conditions and appearance are described as follows: Turfgrass shall have obtained a minimum of 98% surface cover that is generally weed-free and Landscape Plant Materials shall be fully rooted, actively growing and healthy and planting beds generally weed-free. The contractor shall be responsible for the health and maintenance of plants and turfgrass during the establishment period. Plants and turfgrass will not be accepted until after completion of an acceptable establishment period. During the Landscape Plant and Turfgrass Establishment Period the Contractor shall:

1. Water all plants and turfgrass to maintain a moist soil surface at all times until the plants and turfgrass are well established. An adequate supply of moisture must also be maintained within the root zone. Apply water at a moderate rate so as not to displace the mulch, create any water ponding or runoff from the soil supporting the plants and turfgrass. The actual quantity of applied water required to achieve and maintain these conditions is best determined on site by the MSN Agronomist in consultation with the Project Engineer.
2. Prune plants and replace mulch as required.
3. Replace and restore stakes, guy straps, and eroded plant saucers as required.
4. In plant beds and saucers, remove grass, weeds, and other undesired vegetation, including the root growth, before they reach a height of 75 mm (3 inches). After all unwanted vegetation has been removed and proper mulch quantities have been placed/restored, treat all mulched areas with pre-emergence granular ornamental herbicide containing 2.0% trifluralin and 0.5% isoxaben. Apply at 200 lb per acre prior to both early spring and early fall weed seed germination.
5. Spray with approved insecticides and fungicides to control pests and ensure plant survival in a healthy growing condition, as directed by the Contracting Officer in coordination with the MSN Agronomist.
6. Provide the following during turfgrass establishment:
   a. Eradicate all weeds. Water, fertilize, overseed, and perform any other operation necessary to promote the growth of turfgrass.
   b. Mow the turfgrasses as often as necessary to maintain the NCA specified mowing height for each type of turfgrass prior to final acceptance. Begin mowing when cool season turfgrass is 100 mm (4 inches) high. For warm season turfgrasses mow at heights as appropriate for species and cultivar as directed by the RE/CONTRACTING OFFICER in consultation with the MSN Agronomist. Final mowing height is 65 mm (3.0 inch) for cool season turfgrasses and as appropriate for warm season turfgrasses and mow as often as necessary to maintain the proper height while never

removing more than 1/3 of the total height of grass leaves in a single mowing. Mow any portion of the newly developing turfgrass stand that requires mowing without waiting for other areas of slowly developing seedlings to catch-up.

7. Replace dead, missing or defective plant material during the establishment period and an active growing season. Immediately replace each plant with one of the same size and species.
8. Replant any areas void of turfgrass during an active growing season only.
   a. Sod shall be evaluated for species and health thirty (30) days after laying the last piece of sod and reevaluated each 15 days during the establishment period. A satisfactory stand of grass plants from the sod operation shall be living sod uniform in color and leaf texture. Bare spots shall be a maximum two (2) square inches. Joints between sod pieces shall be tight and free from weeds and other undesirable growth.
   b. Seeding shall be evaluated for species and health thirty (30) days after final planting and reevaluated each 15 days during the establishment period. A satisfactory stand of grass plants from the seeding operation shall be 98% coverage uniform in color and leaf texture. Bare spots shall be a maximum of one-half (0.5) square foot. Unsatisfactory areas shall be reseeded within seven (7) days during an active growing season.
9. Complete remedial measures directed by the CONTRACTING OFFICER in consultation with the MSN Agronomist to ensure plant and turfgrass survival.
10. Repair damage caused while making plant or turfgrass replacements.

1.8 LANDSCAPE PLANT AND TURFGRASS ACCEPTANCE.

A. Landscape plant and turfgrass acceptance will occur after completion of the LANDSCAPE PLANT AND TURFGRASS ESTABLISHMENT PERIOD. The Contractor shall have completed, located, and installed all plants and turfgrass according to the plans and specifications. All plants and turfgrass are expected to be living and in a healthy condition at the time of inspection and acceptance. The Contractor shall make a written request two weeks prior to final inspection of the landscape plants and turfgrass. Upon inspection when work is found to not meet the specifications, the PLANT AND TURFGRASS ESTABLISHMENT PERIOD shall be extended at no additional cost to the Government until work has been satisfactorily completed, inspected and accepted.

B. Criteria for acceptance of landscape plants.
   1. Planter beds and earth mound water basins are properly mulched and free of weeds.
   2. Tree support stakes, guys, and turnbuckles are in good condition.

3. Total plants on site as required by specifications and required number of replacements have been installed.
4. Remedial measures directed by the Contracting Officer to ensure plant material survival and promote healthy growth have been completed.

C. Criteria for acceptance of turfgrass shall be as follows:
1. A satisfactory stand of grass plants from the sod operation shall be living sod uniform in color and leaf texture and well rooted into the soil below so that gentle pulling of the turfgrass leaves by hand does not dislodge the sod. Bare spots shall be a maximum two (2) square inches. Joints between sod pieces shall be tight and free from weeds and other undesirable growth.
2. A satisfactory stand of turfgrass plants from the seeding operation shall be 98% coverage uniform in color and leaf texture. Bare spots shall be a maximum of one-half (0.5) square foot.

1.9 PLANT AND TURFGRASS WARRANTY

A. All work shall be in accordance with the terms of the Paragraph, "Warranty" of Section 00 72 00, GENERAL CONDITIONS, including the following supplements:
1. A One Year Plant and Turfgrass Warranty will begin on the date that the Government accepts the plants and turfgrass but not before the end of the Landscape Plant and Turfgrass Establishment Period.
2. The Contractor will replace any dead plant material and any areas void of turfgrass immediately during the warranty period and during an active growing season. A one year warranty for the plants and turfgrass that are replaced will begin on the day the replacement work is completed and accepted.
3. Replacement of relocated plants, that the Contractor did not supply, is not required unless they die from improper handling and care during transplanting. Loss through Contractor improper handling, care, or negligence requires replacement in kind and size.
4. The Government will reinspect all replacement plants and turfgrass at the end of the One Year Warranty. The Contractor will replace any dead, missing, or defective plant material and turfgrass immediately and during an active growing season. The Warranty will end on the date of this inspection provided the Contractor has complied with the work required by this specification.
5. The Contractor shall remove stakes, guy straps and any required tree wrappings from plants having been installed for one year, unless otherwise directed by the CONTRACTING OFFICER in consultation with the MSN Agronomist.

1.10 APPLICABLE PUBLICATIONS

A. NCA Handbook 3420 – Turfgrass Maintenance in VA National Cemeteries re-certified 2011. The Agronomic and Horticultural practices specified in this handbook shall serve as the contractor's official reference guide to all establishment and preliminary maintenance practices employed during this construction project.

B. The publications listed below, form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

C. American National Standards Institute (ANSI) Publications:

ANSI Z60.1-04 ..... Nursery Stock

ANSI Z133.1-06 ..... Tree Care Operations-Pruning, Trimming, Repairing, Maintaining, and Removing Trees and Cutting Brush-Safety Requirements

D. Hortus Third, most current edition. A Concise Dictionary of Plants Cultivated in the U.S. and Canada.

E. American Society for Testing and Materials (ASTM) Publications:

C136-06 ..... Sieve Analysis of Fine and Coarse Aggregates

C516-08 ..... Vermiculite Loose Fill Thermal Insulation

C549-06 ..... Perlite Loose Fill Insulation

D977-05 ..... Emulsified Asphalt (AASTHO M140)

D1557-09 ..... Test Methods for Laboratory Compaction of Soil

D2028-97 (Rev. 2004) ... Cutback Asphalt (Rapid-curing Type)

D2103-08 ..... Polyethylene Film and Sheeting

D5851 (Rev 2006) ..... Planning and Implementing a Water Monitoring Program

F. Turfgrass Producers International:Turfgrass Sodding.

G. U. S. Department of Agriculture Federal Seed Act.

Amended July 2011 ..... Rules and Regulations

PART 2 - PRODUCTS

2.1 GENERAL

All plant and turfgrass material will conform to the varieties specified or shown in the plant list and be true to botanical name as listed in Hortus Third.

2.2 ORGANIC SOIL AMENDMENT

A. All areas to receive turfgrass seeding, sodding or sprigging may require an organic soil amendment to increase organic content and water retention as well as enhance turfgrass growth. If native topsoil has an organic matter content below 4% it should be amended in-place after grading activities are completed to effectively create a satisfactory topsoil horizon.

B. Organic soil amendment will be spread and incorporated into the finished subgrade at the depths indicated on the Contract Drawings in order to raise the organic content of the soil to a minimum of four percent (4%) and a maximum of six percent (6%). Contractor will allow for additional depth of the organic soil amendment to bring all grades to the required finished grades as per the grading plans.

1. Organic Soil Amendment shall be dark brown or black in color and capable of enhancing plant growth. Ninety-eight percent (98%) of the material should pass a one inch (1”) screen. There shall be no admixture of refuse (i.e. noticeable inert contamination) or other materials toxic to plant growth.
2. Acceptable types of Organic Soil Amendments include peat moss, humus or peat, well rotted manure, various mature composts, and commercially available combinations thereof. Acceptable compost may be derived from natural organic sources such as food or animal residuals, yard trimmings, or biosolids. Organic Soil Amendment shall be free of all woody fibers, seeds, and leaf structures, plastic and other petroleum products, and free of toxic and non-organic matter. Unacceptable sole sources of organic matter include untreated sludge from wastewater treatment plants, fresh manure, sawdust, and immature composts.
3. Organic Soil Amendment shall conform to the following minimum material requirements:

Test Parameter	Acceptable Ranges
Organic Matter	27% to 80%
pH	5.5-8.5
Ash	20-65%
Nitrogen	0.4%-3.5%
Phosphorus	0.2%-1.5%
Potassium	0.4%-1.5%
C:N Ratio	25-30:1
CEC	50-150 meq/100 g
Heavy Metals	Less than max. limits established by EPA 503
Inert Contents	< 1% by weight
Water-Holding Capacity	150-200%
Pathogen/Weed Seed Destruction	Proof of EPA minimum Heating requirements

4. Organic content to be determined by the loss of ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 110 °C, plus or minus 5°C.

5. Any topsoil stripped and stockpiled on the site may be used provided that, after testing and addition of necessary additives, it meets the above specification. The Contractor shall provide additional Organic Soil Amendment as required to complete the required work.
6. All Organic Soil Amendment proposed for use shall be tested for conformance to the specifications and results provided to the RE/CONTRACTING OFFICER/MSN Agronomist.

2.3 PLANTS

A. Plants shall be in accordance with ANSI Z60.1, except as otherwise stated in the specifications or shown on the plans. Where the drawings or specifications are in conflict with ANSI Z60.1, the drawings and specification shall prevail.

B. Provide well-branched and formed planting stock, sound, vigorous, and free from disease, sunscald, windburn, abrasion, harmful insects or insect eggs with healthy, normal, and unbroken root systems. Provide trees, deciduous and evergreen, that are single trunked with a single leader, unless otherwise indicated, display no weak crotches. Provide symmetrically developed deciduous trees and shrubs of uniform habit of growth, with straight boles or stems and free from objectionable disfigurements, and evergreen trees and shrubs with well developed symmetrical tops with typical spread of branches for each particular species or variety. Provide ground cover and vine plants with the number and length of runners for the size specified, and the proper age for the grade of plants specified. Provide vines and ground cover plants well established in removable containers, integral containers, or formed homogeneous soil sections. Plants shall have been grown under climatic conditions similar to those in the locality of the project.

C. The minimum acceptable sizes of all plants, measured before pruning with branches in normal position, shall conform to the measurements designated. Plants larger in size than specified may be used with the approval of the Contracting Officer, with no change in the contract price. When larger plants are used, increase the ball of earth or spread of roots in accordance with ANSI Z60.1.

D. Provide nursery grown, Grade 1, plant material conforming to the requirements and recommendations of ANSI Z60.1. Dig and prepare plants for shipment in a manner that will not cause damage to branches, shape, and future development after planting. Never pick-up or move tree species by grasping the trunk. Trees must be moved by lifting the root ball, box or container.

E. Balled and burlapped (B&B) plant ball sizes and ratios will conform to ANSI Z60.1, consisting of firm, natural balls of soil wrapped firmly with burlap or strong cloth and tied.

F. Bare-root (BR) plants shall have the root system substantially intact, but with the earth carefully removed. Cover roots with a thick coating of mud by "puddling" after the plants are dug.

G. Container grown plants shall have sufficient root growth to hold the earth intact when removed from containers, but shall not be root bound.

H. Make substitutions only when a plant (or its alternates as specified) is not obtainable and the Contracting Officer in consultation with the MSN Agronomist authorizes a change order providing for use of the nearest equivalent obtainable size or variety of plant having the same essential characteristics with an equitable adjustment of the contract price.

I. When existing plants are to be relocated, ball sizes shall conform to requirements for collected plants in ANSI Z60.1, and plants shall be dug, handled, and replanted in accordance with applicable sections of these specifications.

2.4 LABELS

Each plant, or group and bundles or containers of the same species, variety, and size of plant, shall be legibly tagged with a durable, waterproof and weather-resistant label indicating the correct plant name and size specified in the plant list. Labels shall be securely attached and not be removed.

2.5 TOPSOIL

A. Topsoil shall be a well-graded soil of good uniform quality. It shall be a natural, friable soil representative of productive soils in the vicinity. Topsoil shall be free of admixture of subsoil, foreign matter, objects larger than 25 mm (one inch) in any dimension, toxic substances, weeds and any material or substances that may be harmful to plant growth and shall have a pH value of not less than 6.0 nor more than 7.0, and should be best suited to the region, climate and plant material specific to the project.

B. Obtain material from stockpiles established under Section 31 20 00, EARTH MOVING, subparagraph, Stripping Topsoil that meet the general requirements as stated above. Amend topsoil not meeting the pH range specified by the addition of pH Adjusters.

C. If sufficient topsoil is not available on the site to meet the depth as specified herein, the Contractor shall furnish additional topsoil. At least 10 days prior to topsoil delivery, notify the Contracting Officer of the source(s) from which topsoil is to be furnished. Obtain topsoil from well drained areas. Additional topsoil shall meet the general requirements as stated above and comply with the requirements specified in Section 01 45 29, TESTING LABORATORY SERVICES. Amend topsoil not meeting the pH range specified by the addition of pH adjusters.

2.6 LIME

Lime shall be agricultural limestone containing not less than 90 percent calcium and magnesium carbonates. Lime must be ground to such fineness that not less than 90% must pass No. 8 mesh and not less than 25% must pass No. 100 mesh. Moisture is not to exceed 10%.

2.7 SOIL CONDITIONERS

A. Peat shall be a natural product of sphagnum moss peat and peat moss derived from a fresh-water site conforming to Fed. Spec. Q-P-166, except as otherwise specified. Peat shall be shredded and granulated to pass through a 13 mm (1/2 inch) mesh screen and conditioned in storage piles for at least six months after excavation.

B. Coarse Sand: Coarse concrete sand, ASTM C-33 Fine Aggregate, shall be clean, sharp, and free of limestone, shale and slate particles and of toxic materials.

C. Perlite shall conform to ASTM C549.

D. Vermiculite shall be horticultural grade and free of any toxic materials and conform to ASTM C516.

E. Pine Bark shall be horticultural-grade milled pine bark, with 80 percent of the material by volume sized between 0.1 and 15.0 mm. (.004in. and .59in.).
   1. Pine bark shall be aged sufficiently to break down all woody material. Pine bark shall be screened
   2. pH shall range between 4.0 and 7.0.
   3. Submit manufacturer’s literature for approval.

F. Organic Matter shall be commercially prepared compost, composted sufficiently to be free of all woody fibers, seeds, and leaf structures, and free of toxic and nonorganic matter.

2.8 PLANTING SOIL MIXTURE

The planting soil mixture shall be composed of 3 parts topsoil, and 1 part peat moss.

2.9 PLANT FERTILIZERS

A. Provide plant fertilizer that is commercial grade and uniform in composition and conforms to applicable state and federal regulations.

B. For new plant material, provide a uniform free-flowing granular complete analysis fertilizer containing a minimum of 10% by weight of nitrogen, phosphoric acid and potash with a minimum of 50% of the nitrogen from a controlled release source such as sulfur coated urea.

C. For existing trees, provide a uniform free-flowing granular fertilizer bearing the manufacturer's warranted statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of 10% nitrogen (of which 50 percent shall be from a controlled release source such as sulfur coated urea.), 10% available phosphoric acid, and 10% potash.

2.10 TURFGRASS FERTILIZER

Provide turfgrass fertilizer that is commercial grade, free flowing, uniform in composition, and conforms to applicable state and federal regulations. Granular fertilizer shall bear the manufacturer's warranted statement of analysis. Granular fertilizer shall contain a minimum percentage by weight of 20% nitrogen (of which 50 percent shall be from a controlled release source such as sulfur coated urea), 5% available phosphoric acid, and 15% potash. Liquid starter fertilizer for use in the hydro mulch slurry will be commercial type with 50 percent of the nitrogen from a controlled release source.

2.11 MULCH

A. Mulch shall be free from deleterious materials and shall be stored as to prevent inclusion of foreign material.

B. Inert mulch materials shall be riverbank stone, granite chips, marble chips, volcanic rock or similar and shall range in size from 25 mm (one inch) to 65 mm (2-1/2 inches) in accordance with ASTM C 136.

C. Organic mulch materials shall be wood based products such as chips, nuggets or shredded hardwood:

1. Straw for turfgrass seed bed mulch shall be stalks from oats, wheat, rye, barley, or rice that are free from noxious weeds, mold or other objectionable material. Straw shall be in an air-dry condition and suitable for placing with blower equipment.

2. Wood cellulose fiber mulch for use with hydraulic application (Hydro mulch) with fertilizer shall consist of specially prepared wood cellulose fiber, processed to contain no growth or germination-inhibiting factors, and dyed an appropriate color to facilitate visual metering of the application of materials. Do not apply any turfgrass seed in this type mixture. On an air-dry weight basis, the wood cellulose fiber shall contain a maximum of 12 percent moisture, plus or minus three percent at the time of manufacture. The pH range shall be from 3.5 to 5.0. The wood cellulose fiber shall be manufactured so that:

   a. After addition and agitation in slurry tanks with fertilizers, water, and other approved additives, the fibers in the material will become uniformly suspended to form a homogenous slurry.

   b. When hydraulically sprayed on the ground, the material will form a blotter like cover.

   c. The cover will allow the absorption of moisture and allow rainfall or applied water to percolate to the underlying soil.

2.12 ASPHALT ADHESIVE

Asphalt adhesive for application with straw mulch shall be liquid asphalt conforming to ASTM D2028, designation RC-70, or emulsified asphalt conforming to ASTM D977, Grade RS-1.

2.13 EROSION CONTROL

A. Erosion control net material shall be heavy, twisted jute mesh weighing 59 kg/m2 (130 pounds per square yard). Openings between strands approximately 250 mm square (1 inch square). Material will be secured with 150 mm (6 inch) wire staples made by the same manufacturer as the netting. Burlap of standard weave with a weight of 100 to 142 g/m (3.5 to 5.0 ounces per yard). All erosion control material is to be installed according to the respective manufacturer's recommendations.

B. Erosion control blanket material shall be cellulose fiber blanket bonded to 6 mm (1/4 inch) square plastic net weighing 10 kg/100 m2 (20 pounds per 1000 square feet) in 1250 mm (50 inch) wide rolls.

2.14 TREE WRAP

A. Breathable synthetic fabric tree wrap. White in color, delivered in 75 mm (3 in.) wide rolls, specifically manufactured for tree wrapping. Tree wrap shall be "Breathable Fabric Tree Wrap" as manufactured by the Dewitt Company, Inc., Sikeston, MO, or approved equal. Submit manufacturer literature for approval.

2.15 STAKES AND GUYING STRAPS

A. Provide stakes for tree support of rough sawn wood, free from knots, rot, cross grain, or other defects that would impair the strength. Stakes shall be a minimum of 50 mm by 50 mm (2 inches by 2 inches), or 65 mm (2-1/2 inches) in diameter, by 2400 mm (8 feet) long and pointed at one end or galvanized steel pipe 32 mm (1 ¼ in.) x 3000 mm (10’) with cap, primed with 2 coats flat black exterior enamel.

B. Hose chafing guards shall be new or used 2-ply reinforced rubber or plastic hose of all the same color on the project.

C. Flags to be fastened to guys shall be surveyor's plastic tape, white in color and 150 mm (6 inches) in length.

D. Guying straps shall be a fabric material designed specifically to guy newly planted trees. No wire should ever be used for this purpose.

E. Turnbuckles shall be galvanized or cadmium-plated and have a 75 mm (3 inch) minimum lengthwise opening fitted with screw eyes.

F. Eye bolts shall be galvanized or cadmium plated having a 50 mm (one inch) diameter eye with a minimum screw length of 40 mm (1-1/2 inches).

G. Deadmen shall be 100 mm by 200 mm (4 inch by 8 inch) rectangular, or 200 mm (8 inch) diameter by 900 mm (36 inch) long sound wood.

H. Arrow shaped or auger iron anchors shall be noncorrosive, and sized according to the manufacturer's recommendation.

2.16 WATER

Water shall not contain elements toxic to plant life.

2.17 ANTIDESICCANT

Antidesiccant shall be an emulsion specifically manufactured for agricultural use that will provide a protective film over plant surfaces permeable enough to permit transpiration.

2.18 SEED

A. Seed shall be state-certified seed of the latest season's crop and shall be delivered in original sealed packages bearing the producer's warranted analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Seed shall be labeled in conformance with U. S. Department of Agriculture rules and regulations under the Federal Seed Act and applicable state seed laws. Seed that has become wet, moldy, or otherwise damaged will not be acceptable. Onsite seed mixing shall be done only in the presence of the Contracting Officer. All turfgrass seeding operations shall be done separately and prior to the application of any mulch material.

B. Minimum Acceptable Seed Quality standards for all turfgrass seed utilized are as follows: Purity 98%, Germination 85%, Weed Seed Content less than 0.5%, Noxious Weeds 0.0%, Inert Material less than 3%, Germination Test Date no older than 6 months.

C. Turfgrass Seed Species shall be:

1. Greenkeeper – WAF Tall Fescue (29.49%)
2. Tar Heel II Tall Fescue (29.98%)
3. Coyote II Tall Fescue (20.78%)
4. Raven Kentucky Bluegrass (6.79%)
5. Thermal Blue Kentucky Bluegrass (6.75%)
6. Avalanche Kentucky Bluegrass (6.80%)

2.19 SOD

A. Sod shall be nursery grown, certified sod as classified in the TPI Guideline Specifications to Turfgrass Sodding. Sod must also conform to the turfgrass species limitations as outlined in seeding mixtures in 2.18C above in this spec.

B. Sod Species shall be:

1. Greenkeeper – WAF Tall Fescue (29.49%)
2. Tar Heel II Tall Fescue (29.98%)
3. Coyote II Tall Fescue (20.78%)
4. Raven Kentucky Bluegrass (6.79%)
5. Thermal Blue Kentucky Bluegrass (6.75%)
6. Avalanche Kentucky Bluegrass (6.80%)

2.20 HERBICIDES AND OTHER PESTICIDES

All herbicides and other pesticides shall be properly labeled and registered with the U.S. Environmental Protection Agency. Keep all pesticides in the original labeled containers indicating the analysis and method of use.

PART 3 – EXECUTION

3.1 LAYOUT

Stake plant material locations and bed outlines on project site for approval by the Contracting Officer before any plant pits or beds are dug. The Contracting Officer may approve adjustments to plant material locations to meet field conditions.

3.2 FINE GRADING AND ORGANIC SOIL AMENDMENT INCORPORATION

A. Contractor shall obtain Contracting Officer's written approval of previously completed rough grading work prior to commencing organic soil amendment incorporation work.

B. Immediately prior to dumping and spreading the approved organic soil amendment, the subgrade shall be cleaned of all stones greater than two inches (2") and all debris or rubbish. Such material shall be removed from the site. Prior to spreading of the organic soil amendment, subgrades which are too compact to drain water and too compact based upon compaction tests shall be ripped with a claw one foot (1') deep, pulled by a bulldozer two feet (2') on center, both directions. Contractor shall then regrade surface.

C. Organic soil amendment material shall be placed and uniformly spread over approved finish sub-grades to a depth sufficiently greater than the specified depth so that after natural settlement and light rolling, the specified minimum compacted depth will have been provided and the completed work will conform to the lines, grades and elevations indicated. Incorporate organic soil amendment by disc harrowing, rototilling or other means in a uniform manner. The depth of incorporation shall be based upon the organic content of the tested and approved organic soil amendment, so as to produce a finished soil with an organic matter content of between four (4) and six percent (6%). Supply additional organic soil amendment material, after in-place testing and approval (see paragraph 1.4. E.1d), as may be needed to give the required organic matter content and finished grades under the Contract without additional cost to the Government.

D. Disturbed areas outside the limit of work shall be spread with four inch (4") minimum depth of organic soil amendment material to the finished grade.

E. No subsoil or organic soil amendment material shall be handled in any way if it is in a wet or frozen condition.

F. Sufficient grade stakes shall be set for checking the finished grades. Stakes must be set in the bottom of swales and at the top of slopes. Connect contours and spot elevations with an even slope.

G. After organic soil amendment material has been incorporated into the subsoil, it shall be carefully prepared by scarifying or harrowing and hand raking. Remove all large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Remove all stones over one and one half inch (1-1/2") diameter from the amended soil bed. The amended soil shall also be free of smaller stones in excessive quantities as determined by the Contracting Officer.

3.3 EXCAVATION FOR PLANTING

A. The whole surface shall then be compacted with a roller or other suitable means to achieve a maximum dry density of 88 to 90 percent in accordance with compaction standards of ASTM D1557 Method D. During the compaction process, all depressions caused by settlement or rolling shall be filled with additional organic soil amendment and the surface shall be regraded and rolled until presenting a smooth and even finish corresponding to the required grades. The acceptable condition of the finished soil grade for all areas that are to be established to turfgrass is best described as "fine textured and firm". The test for satisfactory firmness requires that the surface soil not be fluffy or powdery and will support the weight of an average adult person without creating a visible depression.

B. Prior to excavating for plant pits and bed, verify the location of any underground utilities. Damage to utility lines will be repaired at the Contractor's expense. Where lawns have been established prior to planting operation, cover the surrounding turfgrass before excavations are made in a manner that will protect turfgrass areas. Barricade existing trees, shrubbery, and beds that are to be preserved in a manner that will effectively protect them during the project construction.

C. Remove rocks and other underground obstructions to a depth necessary to permit proper planting according to plans and specifications. Where underground utilities, construction, or solid rock ledges are encountered, the Contracting Officer may select other locations for plant material.

D. Dig plant pits by any approved method so that they have vertical sides and flat bottoms. When pits are dug with an auger and the sides of the pits become glazed, scarify the glazed surface.

E. Where ground cover and planting beds occur in existing turfgrass areas, remove turfgrass to a depth that will ensure the removal of the entire root system, with additional bed preparation as specified in the next paragraph.

F. Where existing soil is to be used in place, till new ground cover and plant beds to a depth of 100 mm (4 inches). Spread peat soil amendment uniformly over the bed to depth of 50 mm (2 inches) and thoroughly incorporate it into the existing soil to a depth of 100 mm (4 inches) using a roto-tiller or similar type of equipment to obtain a uniform and well pulverized soil mix.

Where existing soil is compacted (former roadways, parking lots, etc.) till the soil down to a depth necessary to support the growth of new planting. During tillage operations, remove all sticks, stones, roots, and other objectionable materials. Bring plant beds to a smooth and even surface conforming to established grades.

G. In areas of new grading where existing soil is being replaced for the construction of new ground cover and plant beds, remove 100 mm (4 inches) of existing soil and replace with topsoil. Plant beds shall be brought to a smooth and even surface conforming to established grades. Till 50 mm (2 inches) of peat soil amendment into the topsoil as specified.

H. Using topsoil, form earth saucers or water basins for watering around plants. Basins to be 2” high for shrubs and 4” high for trees.

I. Treat plant saucers, shrub, and ground cover bed areas, after mulching, with preemergence granular ornamental herbicide containing 2.0% trifluralin and 0.5% isoxaben. Apply at 200 lb per acre prior to both early spring and early fall weed seed germination. Plant ground cover in areas to receive erosion control material through that material after material is in place.

3.4 SETTING PLANTS

A. Handle balled and burlapped and container-grown plants only by the ball or container. Remove container-grown plants in such a way to prevent damage to plants or root system. Set plants plumb and hold in position until sufficient soil has been firmly placed around the roots or ball. Set plants so that the root crown is 1” higher than the surrounding grade. Plant ground cover plants after the mulch is in place. Avoid contaminating the mulch with the planting soil.

B. Backfill balled and burlapped and container-grown plants with the native soil removed from the planting hole to approximately half the depth of the ball and then tamp and water. It is desirable to use 100% percent native soil to backfill the hole, but do not use unsuitable fill containing clay, rock or other unsuitable material. For balled and burlapped plants, carefully fold back the top half of the burlap and remove tying materials. Any wire caging or similar material, must be completely removed. Where plastic wrap or treated burlap is used in lieu of burlap, completely remove these materials before backfilling. Tamp and water remainder of backfill native soil; then form earth saucers or water basins around isolated plants with topsoil.

C. Plant bare-root stock arranging the roots in a natural position. Form a hill or mound in the center of the planting hole to allow the plant to sit at the proper depth. The roots are then spread out, over, and down the “hill” in a natural position. The “hill” should be firm to avoid settlement of the entire plant. Remove damaged roots with a clean cut. Carefully work native

soil in among the roots. Tamp and water the remainder of native soil; then form earth saucers or water basins around isolated plants with topsoil.

3.5 TRUNK WRAPPING

Wrap the trunks of deciduous trees immediately after planting. Wrap the trunks of deciduous trees, 40 mm (1-1/2 inches) or greater in caliber with the specified material beginning at the base and extending to the first branches. Remove wrapping after one year. When using Crinkled Paper Wrap, securely tie wrapping at the top and bottom and at 450 mm (18 inch) maximum intervals with twine.

3.6 STAKING AND GUYING

A. Stake and guy plants as shown on the drawings and as specified.
B. Drive stakes vertically into the ground to a depth of 800 to 900 mm (2-1/2 to 3 feet) in such a manner as not to injure the ball or roots, unless otherwise shown on the drawings.
C. Place deadmen not less than 450 mm (18 inches) below the surface of the ground, unless otherwise shown on the drawings.
D. Install iron anchors according to manufacturer's recommendations.
E. Fasten flags securely on each guy strap approximately 2/3 of the distance up from ground level.
F. Remove stakes and guy straps after one year.

3.7 EDGING PLANT BEDS

A. Uniformly edge beds using a sharp tool to provide a clear cut division line between the planted area and the adjacent turfgrass. Do not use any type of manufactured edging material. The properly mowed and maintained turfgrass will serve as edging for all landscape beds.

3.8 MULCHING PLANTS

A. Mulch within 48 hours after planting and apply a preemergence granular ornamental herbicide containing 2.0% trifluralin and 0.5% isoxaben. Apply at 200 lb per acre prior to both early spring and early fall weed seed germination. Do not mulch in ground cover areas that shall have organic material placed before planting.
B. Placing Inert Material: Place polyethylene sheet fiberglass mat Landscape fabric with edges lapped 150 mm to 300 mm (6 inches to 12 inches) to receive inert mulch material. Punch a grid of 6 mm (1/4 inch) holes for drainage in the polyethylene sheet fiberglass mat 300 mm (one foot) on centers over the entire area. Spread inert mulch to a uniform thickness over the membrane as shown.
C. Placing Organic Material: Spread a mulch of wood based origin to a uniform minimum thickness of 50-75 mm (2-3 inches).
D. Keep mulch out of the crowns of shrubs and off buildings, sidewalks, light standards, and other structures.

3.9 PRUNING

A. Prune new plant material and indicated existing plant material in the following manner: Remove dead, broken and crossing branches. Make cuts with sharp instruments as close as possible to the branch collar. Do not make flush cuts. Do not make "Headback" cuts at right angles to line of growth. Do not pole trees or remove the leader. Remove trimmings from the site. Do not use any type of wound dressing on pruning cuts.

B. Existing trees to be pruned are shown on the drawings. Perform tree pruning and cavity work by a licensed arborist an arborist in accordance with ANSI Z 133.1. Remove dead wood 13 mm (1/2 inch) or more in diameter, branches interfering with or hindering the healthy growth of the trees, and diseased branches with a clean cut made flush with the branch collar. Cut back or remove branches as necessary to give the trees proper shape and balance. In removing large limbs, make the initial cut on the underside at a safe distance from the trunk or lateral, to prevent ripping of bark. Ensure branches and trimmings do not endanger traffic or cause damage to property during removal. Section large branches or limbs that cannot be removed in one piece without endangering traffic or property. Lower sections by ropes. Repair any damage resulting from the Contractor's negligence during pruning. Workmen are not permitted to climb trees with climbing spurs. To promote proper healing, cut off flush with the branch collar stubs or limbs that have resulted from improper cuts or broken as a result of former pruning. Remove girdling roots.

3.10 TILLAGE FOR TURFGRASS AREAS

Thoroughly till the soil to a depth of at least 150 mm (6 inches) by scarifying, disking, harrowing, or other approved methods. This is particularly important in areas where heavy equipment has been used. Remove all debris and stones larger than 25 mm (one inch) remaining on the surface after tillage in preparation for finish grading. To minimize erosion, do not till areas of 3:1 slope ratio or greater. Scarify these areas to a 50 mm (one inch) depth and remove debris and stones.

3.11 FINISH GRADING

After tilling the soil for bonding of topsoil with the subsoil, spread the topsoil evenly to a minimum depth of ____150____ mm (6 inches). Incorporate topsoil at least 50 to 75 mm (2 to 3 inches) into the subsoil to avoid soil layering. Do not spread topsoil when frozen or excessively wet or dry. Correct irregularities in finished surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic. Complete lawn work only after areas are brought to finished grade.

3.12 APPLICATION OF FERTILIZER AND LIME FOR TURFGRASS AREAS

A. Apply turfgrass fertilizer at a rate that will deliver 1 pound of nitrogen per 1000 sq.ft. In addition, adjust soil acidity as recommended by soil test results and add any soil conditioners as specified herein for suitable topsoil under PART 2, Paragraph 2.2AandB, and 2.5 TOPSOIL.

B. Spread lime as recommended by the soil test results.

C. Incorporate lime into the soil to a depth of at least 100 mm (4 inches) as part of the finish grading operation. Starter fertilizer should be lightly mixed with the top ½ inch of soil. Immediately restore the soil to an even condition before any seeding or sod placement.

3.13 MECHANICAL SEEDING

A. Broadcast seed by approved application equipment at the rate as outlined in section 2.20C in this spec above. All turfgrass seed shall be planted prior to the application of any mulch material. The seed shall be uniformly distributed in a minimum of 2 directions at right angles to each other. Drag the seeded area to inter-mingle the seed and surface soil by means of spike-tooth harrow, cultipacker, or other approved device.

B. Immediately after dragging, firm the entire area with a roller not exceeding 225 kg/m (150 pounds per foot) of roller width.

C. Immediately after preparing the seeded area, evenly spread an organic mulch of straw by hand or by approved mechanical blowers at the rate of 0.5 kg/m2 (2 tons per acre). Application shall allow some sunlight to penetrate and air to circulate but also reduce soil and seed erosion and conserve soil moisture. Anchor mulch by a mulch tiller, asphalt emulsion, twine, or netting. When asphalt emulsion is used, apply either simultaneously or in a separate application. Take precautionary measures to prevent asphalt materials from marking or defacing structures, pavements, utilities, or plantings.

3.14 HYDRO-MULCHING

When hydro-mulching, mix the slow release starter fertilizer, approved wood cellulose mulch material in the required amount of water to produce a homogenous slurry and then uniformly apply slurry under pressure to deliver the recommended quantity of fertilizer per 1000 sq.ft.

3.15 SODDING

A. Accomplish sodding in accordance with the ASPA Guideline Specifications for sodding. Lay sod at right angles to slope or the flow of water. On slope areas, start at the bottom of the slope.

B. After completing the sodding operation, blend the edges of the sodded area smoothly into the surrounding area. Where sod meets existing turf, cut clean edge to sod depth where new sod abuts existing turf. All sod should be

rolled with a light- weight roller after being laid to eliminate air spaces between the sod and the firmed soil.

3.16 WATERING

A. Apply water to the turfgrass areas immediately following installation at a rate sufficient to ensure thorough wetting of the soil to a depth of at least 50 mm (2 inches). Supervise watering operation to prevent run-off. Supply all pumps, hoses, pipelines, and sprinkling equipment. Repair all areas damaged by water operations. Keep soil surface constantly moist, not wet, until turfgrass plants are well established.

B. Contractor shall deep water all trees twice each week during the Plant Establishment Period, providing water penetration throughout the root zone to the full depth of the planting pits, as verified in the field by the Contracting Officer. Watering shall cease at the first hard frost in the fall and shall resume upon ground thaw in the spring.

3.17 PROTECTION OF TURFGRASS AREAS

Immediately after installation of the turfgrass areas, protect against traffic or other use by erecting barricades, as required, and placing approved signs at appropriate intervals until final acceptance.

3.18 EROSION CONTROL MATERIAL

A. Install and maintain erosion control material meeting the requirements of this specification on the designated areas as shown and specified. Prepare, fertilize and vegetate the area(s) to be covered, as specified, before the erosion material is placed. Immediately following the planting operations lay the material evenly and smoothly and in contact with the soil throughout. Omit the straw mulch from all seeded areas receiving the erosion control material.

B. For waterways, unroll the material in the direction of water flow. When two or more strips are required to cover a ditch area, they shall overlap at least 100 mm (4 inches). In case a strip is to be spliced lengthwise, the ends of the strips shall overlap at least 150 mm (6 inches) with the upgrade section on top.

C. When using erosion control material on slopes, place the material either horizontally or vertically to the slope with the edges and ends of adjacent strips butted tightly against each other.

D. Staple each strip in three rows (each edge and center with the center row alternately spaced) with staples spaced not more than 1200 mm (4 feet) longitudinally. When using two or more strips side by side on slopes, use a common row of staples on the adjoining strips. Staple all end strips at 300 mm (one foot) intervals at the end. Firmly embed staples in the underlying soil.

E. Maintenance shall consist of repairs made necessary by erosion, wind, or any other cause. Maintain, protect, repair, or replace the erosion control material until the Termination of the Plant and Warranty Period.

3.19 RESTORATION AND CLEAN-UP

Where existing or new turfgrass areas have been damaged or scarred during planting and construction operations, restore disturbed area to their original condition. Keep at least one paved pedestrian access route and one paved vehicular access route to each building clean at all times. In areas where planting and turfgrass work have been completed, clear the area of all debris, spoil piles, and containers. Clear all other paved areas when work in adjacent areas are completed. Remove all debris, rubbish and excess material from the station.

3.20 ENVIRONMENTAL PROTECTION

All work and Contractor operations shall comply with the requirements of Section 01 57 19, TEMPORARY ENVIRONMENTAL CONTROLS.

--END--